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NOTES AND LITERATURE

REPULSION IN WHEAT¹

THE evidence was furnished by the (F_2) of the cross: Smooth Black \times Rough White. "Smooth Black" is a wheat obtained from the (F_2) of the Rivet \times Fife cross and it breeds quite true. Its glumes are absolutely glabrous and of a burnished black color. "Rough White" is the well-known Essex Rough Chaff Wheat. The glumes are very hairy and of the ordinary white color. The (F_2) sorted into the following classes:

Rough Black	Rough White	Smooth Black	Smooth White
120	43	47	3

The expectation for the 1:3:3:1 repulsion is:

109.8	49.9	49.3	3.3
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"Blackness" is probably not a simple character for in the (F_2) various degrees of it occur—the patches of it on the glumes being of various sizes and intensities of color. There is evidence that it is closely connected with the "gray" color of Rivet glumes.

F. L. ENGLEADOW

THE DETERMINATION OF THE BEST VALUE OF THE COUPLING-RATIO FROM A GIVEN SET OF DATA¹

MR. G. N. COLLINS has suggested in this journal² a general method for determining the value to assign to the coupling-ratio for a given set of data. He has worked out the value of a coefficient of association for the whole series of possible integral ratios 1:1:1:1, 2:1:1:2, etc., and then used the observed value of the same coefficient to decide which ratio gives the best agreement with the facts. The method is very simple, but does not lead to the value which is the most advantageous in a certain sense. If F_1, F_2, F_3, F_4 , are the set of theoretical frequencies for a given value of the ratio and if F'_1, F'_2, F'_3, F'_4 , are the observed fre-

¹ "A Case of Repulsion in Wheat," by F. L. Engledow, St. John's College, Cambridge (Proc. Camb. Phil. Soc., Vol. 18).

² F. L. Engledow and G. Udny Yule (Proc. Cambridge Phil. Soc., XVII, 436).

quencies, and if $\chi^2 = \Sigma(F' - F)^2/F$, then the probability p that in random sampling deviations of equal or greater improbability will arise is a function of χ^2 which decreases continually as χ^2 increases. The best value of the ratio will then be that value which makes p a maximum or χ^2 a minimum. The problem taken in the note is to determine this value. Unfortunately the solution is not a simple one, depending on an equation of the fourth degree. A few cases are, however, taken as illustrations and the question of probable error is discussed. The recognized fact that, especially when the coupling-ratio is high, its value may receive considerable alteration without greatly altering the closeness of agreement between theory and fact, receives additional emphasis from some of the results given and makes it clear that considerable caution must be used before attaching importance to the precise values of high ratios.

F. L. E AND G. U. Y.

² AM. NAT., XLVI.